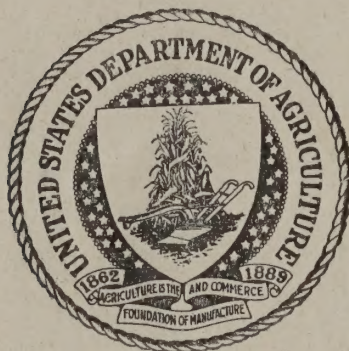


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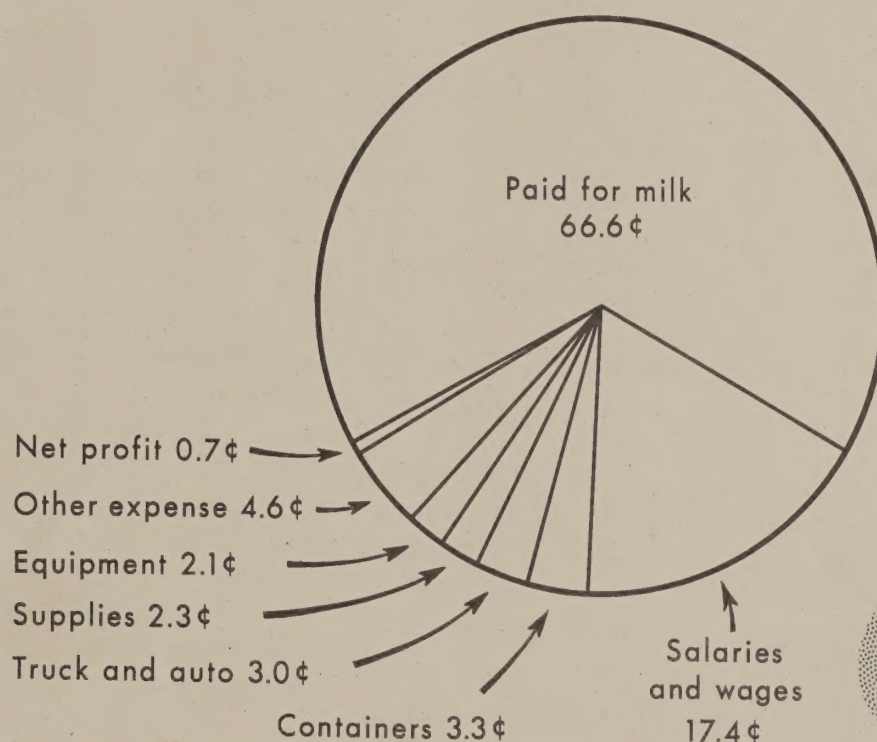


# **COSTS** *and* **MARGINS** *of* **MILK DISTRIBUTORS** *in Memphis, Tenn.*

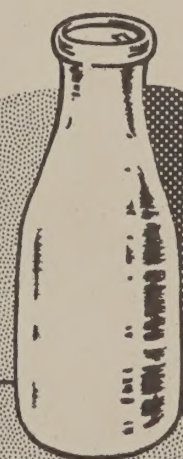
*in*

**1948**

**MILK COSTS IN MEMPHIS**  
DISTRIBUTION OF SALES DOLLAR, SEVEN DISTRIBUTORS, 1948



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UNITED STATES DEPARTMENT OF AGRICULTURE  
BUREAU OF AGRICULTURAL ECONOMICS

in cooperation with

THE TENNESSEE AGRICULTURAL EXPERIMENT STATION

WASHINGTON, D. C.

1950

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## COSTS AND MARGINS OF MILK DISTRIBUTORS IN MEMPHIS, TENNESSEE, IN 1948 <sup>1/</sup>

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### INTRODUCTION

The milk distributors' spread in Memphis in 1948 was lower than the spread in any other large city in Tennessee that year, and was one of the lowest in the United States. This fact lends unusual interest to information concerning the costs and operating standards of Memphis milk distributors.

A quart of milk was delivered to the Memphis consumers' doorstep for an average price of 18.8 cents, in 1948. Producers received 12.8 cents per quart, leaving a spread of 6.0 cents per quart for the distributor. By contrast, the estimated

<sup>1/</sup> This report gives results of a study conducted cooperatively by the Bureau of Agricultural Economics and the University of Tennessee. Part of the cost of the study was paid from funds authorized by the Research and Marketing Act of 1946. Distributors in Memphis cooperated by making records available and otherwise facilitating the study.



national average retail price of fluid milk marketed through wholesale channels (not including milk retailed directly by the farmers) was 21.4 cents per quart. The farmer received 12.0 cents, leaving 9.4 cents per quart for the distributor.

The Memphis metropolitan district had an estimated population exceeding 400,000 in 1948. This area included parts of Shelby County, Tenn., and of Crittenden County, Ark. Milk distributors in Memphis served a much wider area, however, as they delivered to many cities and towns within a radius of 60 to 70 miles; some were 125 miles away. The population served by milk distributors in Memphis has increased greatly over the last two decades. In 1930 the population of the Memphis metropolitan district was 276,126. The increase from 1930 to 1948 was about 45 percent. The delivery of milk by the distributors of Memphis to outlying towns began only in recent years.

Milk was processed and sold in Memphis by 10 distributors located in or near the city in the year here reported. The size of these businesses as measured by number of delivery routes in operation ranged from 3 to an estimated 80. These dealers bought all or most of their supplies of milk. Three of them also maintained dairy herds, but they produced less than half of the milk they used. The last of the producer-distributors (that is, distributors who produce most or all of their own supply) discontinued operations in 1948. There were 215 of these in 1929, but the number decreased steadily through the years, so that there were only 35 by 1941. The number of distributors other than producer-distributors remained about the same during the period from 1929 to 1948. It is estimated that the producer-distributors in Memphis in 1941 sold about 7,250,000 pounds of milk. As these producer-distributors discontinued business, the volume of sales of the remaining distributors increased correspondingly.

Memphis distributors obtained a large proportion of their milk supply, approximately 120,000,000 pounds, from about 700 producers within the Memphis milk shed, during the year studied. Additional supplies of milk and skim milk -- nearly 4,000,000 pounds -- were purchased in Wisconsin during the year. About five-sixths of the supply of local milk was purchased by distributors through the local milk producers' bargaining association, the Mid-South Milk Producers Association. When the supply of milk produced within the milk shed fell below the requirements of the market, this Association procured the necessary quantity from outside sources. Dealers themselves bought cream and condensed skim milk directly from outside sources during periods of local shortage.

The milk-distribution activities of Memphis dealers were supplemented in noteworthy respects by the Memphis Dairy Exchange. The Exchange is owned jointly by the distributors, and through it they buy bottles, cases, and other supplies, such as Vitamin D concentrate.

The Memphis Dairy Council is another important organization relating to the milk industry in the area. This Council is a joint undertaking of milk producers and distributors and ice cream manufacturers in the field of sales promotion and education. The staff of the Council works with medical groups, schools, and consumer groups, teaching the role of dairy products in nutrition.

#### PURPOSES OF STUDY

The purposes of this study were to ascertain from milk dealers' records (1) the costs and margins in processing and distributing milk in Memphis, (2) the



relationship of various cost factors to operating expenses and net profits and, (3) to develop certain standards of operation by means of which dealers can rate their own operations and find ways to reduce costs. When used properly, the exchange of information on costs is an effective agency of industrial progress. This study serves also as a source from which consumers can obtain information on the costs of milk distribution.

#### PROCEDURE

The survey was conducted as a cooperative project between the Bureau of Agricultural Economics, U. S. Department of Agriculture, and the Agricultural Experiment Station of the University of Tennessee. The data were assembled from seven of the milk plants in Memphis during the period March 1 through June 15, 1949.<sup>3/</sup> It was estimated that the seven distributors handled about two-fifths of all dairy products, excluding butter and ice cream, used in the Memphis market.

From 1 to 3 weeks was devoted to each plant in examining and copying all essential records. Data were obtained on plant operations for the year 1948, because six<sup>4/</sup> out of seven distributors prepared financial reports on a calendar-year basis. Detailed tabulations were made from general ledgers of all sales and expenses, by months. Yearly statements of sales, expenses, and profits, as well as assets, liabilities, and capital, were taken from operating statements and balance sheets.

The classifications of income, expenses, and other data established for this study, required greater detail than was generally available from dealers' summary records. Consequently, most accounts other than those for milk purchased from producers and for labor had to be reconstructed. In some instances ledger entries gave enough information to permit the items to be classified properly; in other instances it was necessary to refer to original invoices. Data on quantities of produce purchased and sold were readily available in dealers' copies of utilization audits made by the milk producers association. Retail and wholesale transactions were found to be summarized separately in dealers' records for the purpose of reports on sales taxes.

When ascertaining the sales and expenses, certain adjustments were made in the figures taken from dealers' records. This was necessary if the operating statements and other data were to be compared and combined. The major adjustment was in eliminating all income and expenses derived from the manufacture of butter and ice cream. Direct expenses relating to butter and ice cream were identified from invoices, or other information, and the expenses not otherwise classified were allocated on the basis of gross margins.

A recapitulation of the records obtained from the Memphis distributors is contained in table 1. The importance of each of the income and expense items on the operations of the distributors is discussed below.

#### SALES, EXPENSES, AND PROFITS

Yearly sales of milk and other dairy products by the seven distributors averaged \$583,000 per distributor in 1948 (table 1). Approximately \$389,000, or 66.7

<sup>3/</sup> One of the 10 plants that operated in 1948 went out of business early in 1949 and the two largest plants did not consent to cooperate in this study.

<sup>4/</sup> Information on the seventh plant was obtained for the period from December 1, 1947 through November 30, 1948.



cents out of every dollar of sales, was spent for raw milk, cream, and other dairy products purchased. The gross margin available for operating expense and net earnings was \$194,000, or 33.3 cents per dollar of sales. Slightly more than 32.6 cents of the gross margin on sales was absorbed in operating expenses, leaving a balance of 0.7 cents per dollar of sales as net profit (cover chart).

Labor constituted the largest item of expense, averaging \$101,000 per year, or 17 cents per dollar of sales. The principal items of labor cost were salaries for plant employees of about 6 cents, and for deliverymen of about 7 cents per dollar of sales.

After product and labor costs, about 15 cents per dollar of income was spent for all other operations and services. This was broken down as follows: containers and truck operation, 3 cents each; supplies and plant equipment, 2 cents each; and, miscellaneous expenses, 5 cents.

The costs and returns in milk distribution may also be expressed as rates per hundredweight or per quart of milk.<sup>2/</sup> The results on this basis are shown in table 2. The data shown in this table are not to be compared directly with prices paid by consumers or received by farmers for milk of any particular kind or classification, since they are averages computed by dividing the total quantity of milk handled in all forms into total receipts and expenses. It happened that the average margin of 6.17 cents per quart was within about one-sixth cent of the spread between the prices consumers paid and prices farmers received for milk that was later delivered to homes in quart containers. However, the average spread per quart of all milk could have been higher or lower than the spread on quarts delivered to homes, depending on the volume of business represented by sales of cream or other products, or on the volume of business represented by the various sizes of containers, or whether sales were more largely to retail or to wholesale outlets.

Milk distributors received \$8.67 per hundredweight of milk or milk equivalent sold. Product cost averaged \$5.78 per hundredweight. The net gain on sales above product cost averaged \$2.89. After deduction of all expenses, \$0.06 remained as net earnings.

The computed sales price per quart of milk equivalent sold averaged 18.5 cents. The gross margin on sales above product cost averaged approximately 6.17 cents per quart, and net earnings were 0.13 cents per quart. One dealer operated at an expense of 5.3 cents per quart; at the other extreme one dealer had a cost of 8.2 cents per quart. Some dealers were more efficient in some phases of their operations than in others. Moreover, differences in the type of products handled, and classes of buyers served, resulted in costs higher or lower than the average.

5/ The costs of marketing a quart bottle of milk might be ascertained separately from the costs for other container sizes, or for cream, etc. Under any circumstances, such a determination is expensive to make, and the results are subject to variation according to the judgments made in allocating many cost items. A simpler procedure was used in this study. The units of product of various kinds and sizes of container were converted into quarts of "milk equivalent". The total quarts of milk equivalent were then divided into total sales and expenses, and the result was expressed as income and costs per quart of milk. For this study, 1 quart of any liquid product (whether milk, cream, buttermilk, etc.) was counted as a quart of milk equivalent. One pound of butter or 1 pint of cottage cheese were also considered to be 1 quart of milk equivalent. The milk equivalents of sales, by this method of calculation, were very nearly equal to the quarts of whole milk needed to produce the usual line of products handled by milkdealers in Memphis.



Table 1. - Average sales, product cost, expenses, and net profits.  
Seven milk distributors, Memphis, Tenn., 1948

Item	Dollars	Cents per dollar of sales
Sales	582,900	100.0
Product cost	388,600	66.7
Margin on sales	194,300	33.3
Labor		
Administrative and plant	57,700	9.9
Selling and delivery	43,700	7.5
Containers	19,100	3.3
Supplies	13,400	2.3
Equipment	12,300	2.1
Power, etc.	5,800	1.0
Buildings	2,900	.5
Taxes	4,600	.8
Truck and auto	17,500	3.0
Advertising	4,000	.7
Office expense	1,100	.2
Telephone and telegraph	400	.1
Miscellaneous	7,600	1.2
Total expenses	190,100	32.6
Net profit	4,200	.7



Table 2. Average sales, product cost, expenses and net profits per hundredweight and per quart of milk equivalent sold by seven milk distributors, Memphis, Tennessee, 1948

Item	Amount per 100 pounds (dollars)	Amount per quart (cents)
Sales	8.67	18.52
Product cost	5.78	12.35
Margin on sales	2.89	6.17
Expenses:		
Labor		
Administrative and plant	.86	1.83
Selling and delivery	.65	1.39
Containers	.28	.61
Supplies	.20	.42
Equipment	.18	.39
Power, etc.	.09	.18
Buildings	.04	.10
Taxes, licenses and insurance	.07	.15
Truck and auto	.26	.56
Advertising	.06	.13
Office expense	.02	.03
Telephone and telegraph	--	.01
Miscellaneous expense	.12	.24
Total expenses	2.83	6.04
Net profit	.06	.13



During 1948, a total of 22 million quarts of milk equivalent was sold by the seven distributors (table 3). Four types of whole-milk products accounted for 16 1/2 million quarts. Regular Grade A milk, containing an average of 3.95 percent of butterfat, made up about three-fourths of the sales in this group of product. Other whole-milk products included homogenized vitamin D milk, high-test milk and Bulgarian buttermilk.<sup>6/</sup> The average butterfat contents of these and other products are shown in table 3.

Plain buttermilk, chocolate milk, and skim milk (collectively termed low-fat products, since they were products from which half or all of the milk fat had been removed) accounted for 4 1/2 million quarts of sales. In this group of products, buttermilk formed more than two-thirds of the total and chocolate milk more than one-fourth. Sales of skim milk were negligible. The material used in producing these products was mainly skim milk that remained after milk was separated for the cream, but some skim milk was imported and some was made by reconstituting condensed and dried skim milk.

Sales of cream amounted to nearly 900,000 quarts during the year. This group of products consisted of light cream, containing about 18 percent of butterfat, heavy cream, of about 36 percent butterfat, and bulk cream sold to ice cream manufacturers. About 3 quarts of light cream were sold for every quart of heavy cream. These two items made up the regular trade in cream. During the months of heavy milk production, local supplies of cream were larger than needed for the regular trade, so about 380,000 quarts of cream were sold to ice cream manufacturers.

The remaining group of items, 124,000 quarts of milk equivalent, consisted of such items as sour cream, and creams containing 10 or 12 percent of butterfat, eggnog, cottage cheese, and butter.

The relative importance of the various items might also be expressed in terms of butterfat, or in sales value. Grade A milk accounted for 54 percent of the butterfat sold, and whole-milk products altogether accounted for 79 percent. Sales of light and heavy cream utilized 13 percent, and cream for manufacture, low-fat milk products and other products utilized 8 percent. In sales value of products, whole-milk products accounted for 75 percent, light and heavy cream 8 percent, and low-fat and other products 17 percent.

Sales to family trade on retail routes and through retail rooms in plants were the source of 38 percent of total dollar sales (fig. 1). Three of the dealers concentrated heavily on wholesale trade, receiving less than 10 percent of their sales volume from retail customers. The four dealers whose retail sales were comparatively large received about half of their income from this source.

Sales to wholesale customers were principally to stores, restaurants, and similar trade outlets. Sales to stores accounted for about half of the wholesale business. Most of the sales of dairy products in nearby towns by Memphis

<sup>6/</sup> "Bulgarian buttermilk" in Memphis, in 1948, was a product of ordinary buttermilk culture. Formerly the *Lactobacillus bulgaricus* culture was used, and the product name has persisted for buttermilk made with whole milk.



Table 3. - Sales of dairy products, seven milk distributors, Memphis, Tennessee, 1948<sup>1/</sup>

Product	Average	Quantity		
	butterfat content	Quarts	Percent	
	Percent			
Whole milk products				
Grade A milk	3.9	11,421,000	68.9	
Homogenized vitamin D milk	3.8	3,490,000	21.0	
High test milk	4.7	1,220,000	7.4	
Bulgarian buttermilk	3.2	452,000	2.7	
Total	4.0	16,583,000	100.0	75.3
Low-fat milk products				
Buttermilk (plain)	--	3,087,000	69.2	
Chocolate milk	2.1	1,324,000	29.7	
Skim milk	--	48,000	1.1	
Total		4,459,000	100.0	20.2
Cream				
Light cream (Table or X)	18.0	371,000	43.0	
Heavy cream (Whipping or XX)	37.0	112,000	13.0	
Bulk, for manufacture into ice cream <sup>3/</sup>		379,000	44.0	
Total		862,000	100.0	3.9
Other products <sup>2/</sup>	3/	124,000		.6
Total sales of all products	3.8	22,028,000		100.0

<sup>1/</sup> Does not include milk and cream used in ice cream by one dealer.

<sup>2/</sup> Includes eggnog, 10 and 12 percent cream, butter, and cottage cheese.

<sup>3/</sup> Items included had a wide range of butterfat content.

distributors was wholesale business. Much of this business was done with stores, but in some of the outlying towns milk was sold to local distributors who operated delivery routes.

Prices charged for milk and other dairy products by Memphis milk distributors during the first 7 months of 1948 were based on the price of 18 cents per quart for Grade A or standard milk, delivered to homes. The wholesale price for quarts of Grade A milk was 16 cents (table 4).

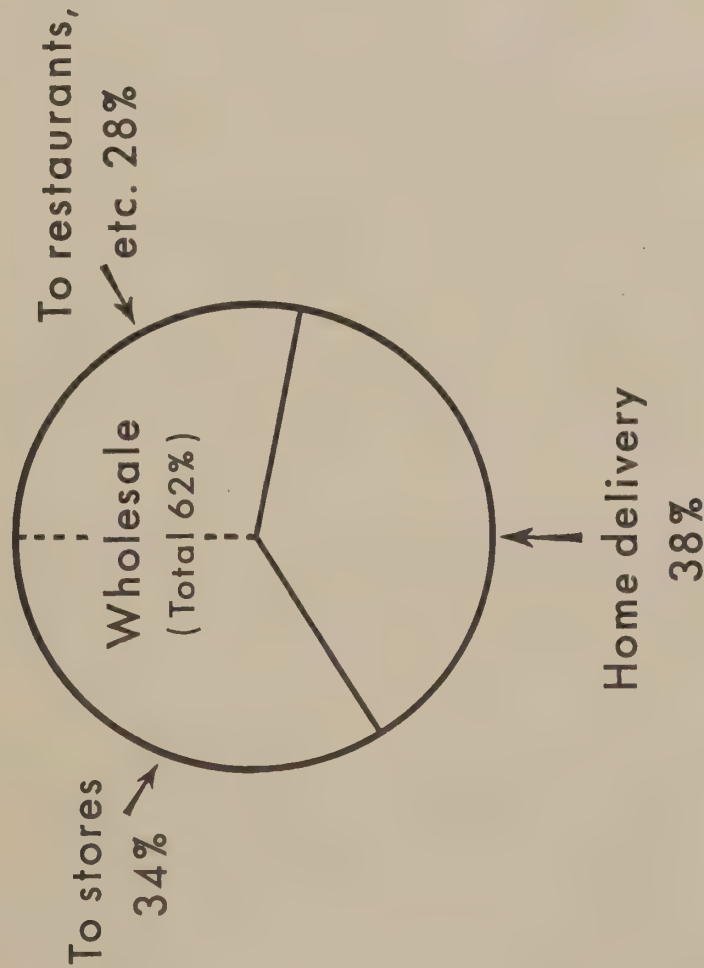
In a general price increase, effective August 1, 1948, the price of home-delivered quarts of Grade A milk and of most other products in quart bottles was raised 2 cents. The price of quantities of one-third of a quart did not change, however. The increase in wholesale prices of products in quart bottles was 1 cent for homogenized vitamin D milk and plain buttermilk and 1 1/2 cents for other products. Thus, margins on sales at wholesale were narrowed, relative to the margins on retail sales.

Prices for light and heavy cream in 1/3-quart bottles delivered to homes were 24 and 40 cents, respectively, up to August 1, 1948. Wholesale prices were 21 and 36 cents. The prices of all cream items advanced approximately 10 percent on August 1.

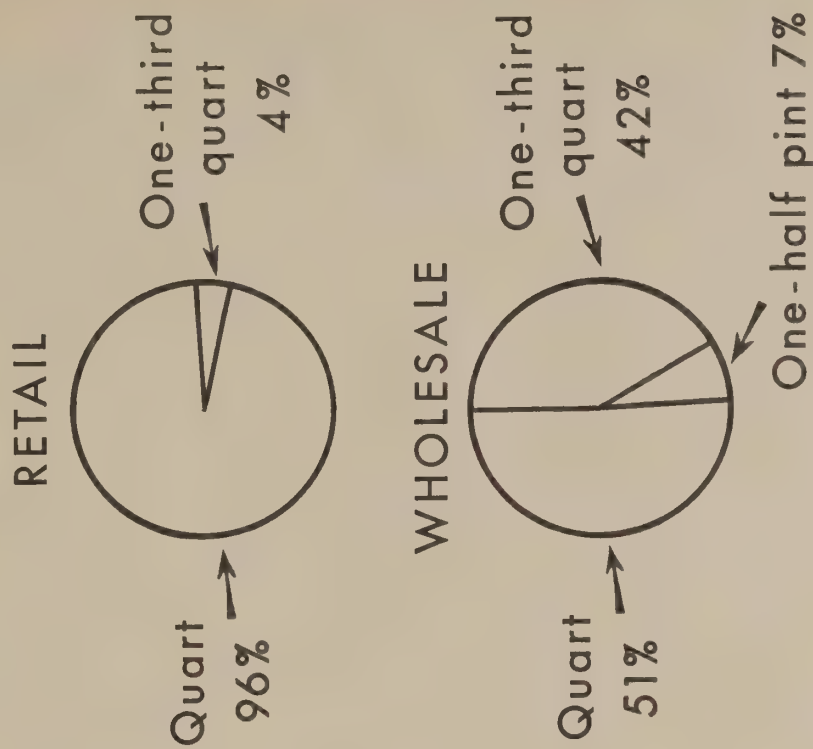


# WHOLESALE AND RETAIL SALES OF MILK BY TYPES OF OUTLETS AND SIZES OF BOTTLES, SEVEN DISTRIBUTORS, MEMPHIS, TENN., 1948

MILK SALES



SIZES OF BOTTLES



PERCENTAGE DISTRIBUTION OF MILK IS BASED ON VALUE OF SALES. PERCENTAGE USAGE OF BOTTLES IS BASED ON NUMBERS OF BOTTLES, AND EXCLUDES SALES IN BULK CONTAINERS. ONE-HALF PINT BOTTLES WERE SOLD ONLY OUTSIDE OF MEMPHIS AND SHELBY COUNTY, TENN.







Table 4. - Prices of milk and milk products charged by milk distributors, Memphis, Tennessee, 1948

Item	Prices effective				Prices effective			
	: Jan. 1, 1948 to July 31, 1948 :				: Aug. 1, 1948 to Dec. 31, 1948 :			
	Retail		Wholesale		Retail		Wholesale	
	: per	: per	: per	: per	: per	: per	: per	: per
	: quart	: 1/3	: quart	: 1/3	: quart	: 1/3	: quart	: 1/3
	: quart		: quart		: quart		: quart	
	: cents	: cents	: cents	: cents	: cents	: cents	: cents	: cents
High test milk	: 21	: 10 1/2	: 19	: 7 1/2	: 23	: 10 1/2	: 20 1/2	: 7 1/2
Grade A milk	: 18	: --	: 16	: 6 1/2	: 20	: 10	: 17 1/2	: 6 1/2
Homogenized vitamin D	: 19	: 10	: 17	: 7	: 21 1/2	: 10	: 18	: 7
Bulgarian buttermilk	: 20	: 10	: 18	: 7	: 22	: 10	: 19 1/2	: 7
Buttermilk (plain)	: 12	: --	: 10	: --	: 13	: --	: 11	: --
Chocolate milk	: 20	: 10	: 18	: 7	: 22	: 10	: 19 1/2	: 7
Skim milk	: --	: --	: --	: --	: 16	: --	: 14	: --
Light (X) cream	: 65	: 24	: 55	: 21	: 70	: 27	: 60	: 23
Heavy (XX) cream	: 100	: 40	: 100	: 36	: 120	: 45	: 110	: 40

#### Product Cost

Product cost is defined here to include the cost of all whole milk, skim milk, cream, and other dairy products, delivered to the processing plants. Condensed milk and powdered milk were used in some of the skim-milk products during 1948 when fresh milk was in short supply. Chocolate, sugar, and similar ingredients used in processing, were classified under supplies.

Milk bought directly from producers made up 90 percent of the total cost of dairy products bought by these seven Memphis milk distributors in 1948. The cost of "imported" milk was about 6 percent, cream and condensed skim milk about 1 percent each, and all other items 2 percent, of the total cost of dairy products purchased.

The average price paid for producer milk by these seven dealers was \$6.16 per hundredweight, for milk which had an average of 4.36 percent of butterfat. During the first 7 months of the year, the price to producers for Class I milk <sup>17</sup> was \$5.76 per hundredweight for milk containing 4.0 percent butterfat. For milk containing more or less than 4.0 percent butterfat, the price was higher or lower by 9 cents per one-tenth percent of butterfat.

<sup>17</sup> Class I milk was milk sold by dealers in the form of bottled milk, buttermilk, chocolate milk, and cream. Class II milk was milk used for any other purpose.



Beginning August 1, 1948, the price for Class I was raised to \$6.26 per hundredweight. The butterfat differential remained at 9 cents.

A small part of the local milk supply (probably less than 5 percent) was bought by these dealers at the Class II price. During the months May through August, when the volume of Class II milk was greatest, the Class II price ranged from \$3.89 to \$4.18 per hundredweight.

The average cost of all milk and dairy products purchased from sources other than local producers, was \$3.63 per hundredweight. This figure is based on the reconstituted quantities of condensed and dried skim milk. The average butterfat content of this part of the supply was 2.08 percent.

The product cost per dollar of sales averaged 66 to 67 cents for four distributors, but ranged from 63.5 to 74.1 cents for all distributors. "Product cost per dollar of sales" is almost, but not exactly, the same as "percentage of the consumer's dollar returned to the producer". Sales include some business with wholesale customers, and product cost includes some purchases of processed dairy products.

Variations in product cost between dealers had a variety of causes. One of these was differences in the average butterfat content of milk purchased from producers. Other factors affecting product cost per dollar of sales were the quantity of product lost in handling, the kind of product sold, and the proportions of retail and wholesale business.

At one plant the average butterfat content of milk from producers was 4.3 percent. At the other end of the range, another plant had an average of 4.6 percent. The premium for extra butterfat was 9 cents per one-tenth percent, so the range in product cost resulting from the range in butterfat content was 27 cents per hundredweight of milk purchased, or more than one-half cent per quart.

The quantities of product lost in receiving, processing, and delivering milk averaged about 4 percent of the quantity handled. Thus, for each 100 pounds of products sold, the dealer had to buy 104 pounds. There was considerable variation among dealers, and the losses of butterfat and the total pounds of product did not always vary together. Of the two methods of measuring losses -- total product pounds and butterfat pounds -- the butterfat losses varied less.

Product can be lost in several ways. It may adhere to cans, vats, and pipes. There may be leakage of equipment or breakage of bottles. There may be poor control of quantities stored or sent out and returned on delivery routes. In addition, losses of butterfat may come from inaccurate determinations of the butterfat content of products purchased or sold.

Losses of butterfat of these seven Memphis dealers ranged as high as 5.7 percent of the butterfat purchased. On the other hand, three of the seven dealers managed to keep their losses below 2 percent. The lowest butterfat loss for any of these dealers was 1.19 percent. The highest loss was 5.74 percent. In other words, one dealer had to buy 101.19 pounds of butterfat for every 100 pounds sold, while another had to buy 105.74 pounds per 100 pounds sold. The cost of product to the latter dealer, at the average product cost of \$5.86 per hundredweight, would be \$6.20, while the dealer with a low product loss would have had a product cost of \$5.93. The difference is 27 cents per hundredweight, or more than 1/2 cent per quart of product sold.



The effect of kind of products sold on the product cost per dollar of sales may be illustrated as follows: A hundred pounds of milk sold as Grade A milk in quarts delivered to homes cost Memphis consumers \$9.30 at the prices in effect in the latter part of 1948. Dealers paid \$6.17 per hundredweight for milk containing the 3.9 percent of butterfat usually sold in this grade of milk. Thus, product cost would be 66 cents per dollar of sales for Grade A milk in quarts at retail. On the other hand, 100 pounds of milk containing 3.9 percent of butterfat would yield, without allowance for handling losses, 31 one-third quarts of light cream and 36 quarts of buttermilk, these having a total value at retail prices of \$13.05. In this form, product cost would be 47 cents per dollar of sales.

The effect of channel of sale on product cost as percentage of sales value may be illustrated by margins on quart bottles of Grade A milk. During the latter part of the year under study, this item sold for 20 cents per quart at retail and 17 1/2 cents per quart at wholesale. The cost of the milk itself, at prices paid to producers for milk of the usual butterfat content for this grade, was 13 1/4 cents per quart. Thus, product cost was 66 percent of the retail sales dollar and 76 percent of the wholesale sales dollar.

### Labor

Expense of labor including officers' and directors' salaries, comprised more than one-half of the total expense involved in processing and delivering milk.

Officers' and directors' salaries ranged from 1.2 cents to 3.4 cents per dollar of sales, averaging 2.3 cents. Four dealers made no explicit provision for salaries for owners who were managing the business. In these instances, a salary allowance was computed on the basis of the relation of net margin on sales to salaries taken by other distributors. It seemed reasonable that some compensation for the owners should be allowed as a cost in these instances. Their estimated salaries amounted to about one-third of the total salary payments, and for two dealers approximated the amount of net loss on the year's business.

The cost of labor for office personnel varied from 0.4 to 2.8 cents per dollar of sales -- averaging 1.5. The number of quarts equivalent of milk sold per day per office worker varied from 1,200 to 7,700, averaging 1,700. It was observed that in addition to usual factors of office efficiency, where a larger percentage of the trade was wholesale, a larger volume of sales was handled with a given number of workers than in a strictly retail business. (See page 21.)

The office personnel of the distributor who had the highest net earnings handled the bookkeeping on approximately 47 percent more quarts of milk equivalent per person per day than did the office workers of the dealer who had the least profit. Most of the dealers also used public accountants for some accounting services. The use of public accountants displaced some office labor that otherwise would have been needed.

Plant operations were more highly standardized than were office activities, and efficiency of labor in the plant varied within a slightly narrower range than did the efficiency of the office forces.

The quarts of milk equivalent processed per plant worker per day varied from approximately 200 to 1,100, averaging 560.



In the three plants where the highest number of quarts of milk equivalent were handled per worker, net earnings were highest; in the three plants handling the lowest number per worker, net earnings were lowest.

The cost of labor employed in plants ranged from 3.8 to 9.6 cents per dollar of sales, and averaged 6.1 cents.

Several methods were followed by dealers in establishing the wages of routemen. Generally speaking, deliverymen on wholesale routes worked on a monthly salary; but in most instances these men also received a commission ranging from 2 to 8 percent of their collections. Some dealers paid wholesale routemen a straight commission of 6 to 8 percent of their collections. The wages of retail deliverymen were usually commissions ranging from 10 to 13 percent of collections. In some instances, this was supplemented by a small base salary. Some dealers, in addition to the regular salary and commissions, paid bonuses to deliverymen who obtained new customers -- for example, a bonus of 1 day's collection for a new customer which stayed more than a month.

Helpers were sometimes employed by dealers to assist in making deliveries on wholesale routes. They were paid semimonthly or monthly wages by the distributors. On retail routes, the routemen themselves usually hired and paid the helpers needed on their routes.

The cost of labor for delivering milk varied from 2.7 to 9.8 cents per dollar of sales, averaging 6.9 cents. This cost was approximately 2 1/2 times higher for dealers having retail routes than for dealers operating only wholesale routes. Additional selling and delivery costs for retail sales-room and garage employees raised the total cost of labor for selling and delivery to 7.50 cents per dollar of sales. Dealers who employed mechanics to maintain their trucks had lower truck expense, offsetting the added labor expense.

The quarts of milk equivalent delivered per day on retail routes for three distributors varied from 340 to 485, averaging 367 units; the average daily sales ranged from \$74 to \$110, averaging \$85 per route.

On wholesale routes of six distributors from 500 to 1,400 quarts of milk equivalent, or an average of 1,170 quarts, were delivered per route per day. The dollar sales on these routes varied from \$100 to \$230, averaging \$182 per route per day.

The average monthly wage of employees was approximately \$165. Wages of office workers ranged mostly from \$150 to \$175, averaging \$174 per month. Wages of plant workers averaged somewhat lower, \$158 per month, but covered a wider range. About two-thirds of the plant workers had wages in the range of \$125 to \$200 per month. Among deliverymen there was wide variation in monthly wages (including commissions). The average was \$268. Complete data on payments to individual drivers were lacking, but the range of wages of the drivers for whom data were available was from less than \$100 to nearly \$400. This wide range is mainly a reflection of the variation in size of load. The larger loads required helpers, most of whom were paid directly by the drivers. Most of such payments would come out of wages that were above the average.

To summarize, total salaries and wages of all personnel averaged approximately 17 cents per dollar of sales, or 3.2 cents per quart of milk equivalent. Wages of deliverymen comprised about 40 percent of the total labor cost and about 35 percent of the cost of plant employees.



### Containers

Bottles, caps, cans, and cases were included under costs of containers; they approximated \$19,000 per plant. Total container expense averaged 0.61 cents per quart and ranged from 0.34 to 0.82 cents.

All milk in the Memphis market was distributed in one-third quart or in quart square glass bottles. One-half pint bottles, by regulation of the State Dairy Commission, could not be sold legally in Memphis and Shelby County. One-half pint containers were used for some of the sales outside of the Memphis area, but they made up only 5 percent of the total number of containers used by these seven distributors. Almost all one-third quart and one-half pint containers of dairy products were sold wholesale. (fig. 1).

Grade A, or the regular milk, accounted for 58 percent of the sales of all products in quart containers. All the plain buttermilk and 92 percent of the high-test milk were also sold in quart bottles (table 6). On the other hand, one-third quart bottles were used for homogenized milk, Bulgarian buttermilk, chocolate milk, and cream more than any other size of bottle. An average of only 210,000 one-half pint containers of milk were sold by each distributor.

In addition to the sales of milk products in bottles, substantial quantities were sold in bulk containers, about 1 million quarts out of the total of 22 million. Usually, bulk milk was sold to other dealers or to wholesale customers in 1-gallon, 5-gallon, or 10-gallon cans. The principal items sold in bulk were grade A milk and cream, sold for manufacture into ice cream.

Cost of bottles averaged about 0.27 cent per quart of milk equivalent, or 1.5 cents per dollar of sales. A "universal" bottle was used by all dealers, eliminating the usual expense of exchanging bottles, and possibly reducing the total loss of bottles in the market. The bottles were not marked with the name of the dealer, but only with the mark of the Memphis Dairy Exchange. Dealers bought bottles from the Exchange at a cost of 3 1/4 cents each for quart, and 3 cents for 1/3 quart, which was slightly below the actual cost to the Exchange of new bottles. In addition, dealers paid monthly a "fillage" charge of 80 cents per 1,000 units of milk sold in bottles. The total of these charges is included as bottle cost.

Whatever the effect the use of the universal bottle may have had on total bottle costs for the market, it did not prevent a wide variation of costs from dealer to dealer. The range of bottle costs was from 0.07 to 0.35 cents. Both the high and the low extremes were represented in the group of "wholesale" dealers.

Low bottle costs tended to accompany a high number of trips per bottle. The average number of trips per bottle for these seven dealers was 22. The dealer with lowest bottle cost had 29 trips per bottle; the highest bottle cost accompanied record of 17 trips per bottle. Bottle losses resulted from breakage and from failure of customers to return bottles. Some dealers reported studies of their plant operations showing breakage within the plant of 0.7 to 1 percent of the bottles handled daily.

Two types of covers were used for capping and sealing bottles. The two-piece type consisted of the ordinary plug cap plus a hood which was clamped over the top of the bottle, extending down over the pouring lip for about three-fourths of an inch. Other plants used a single cap made of aluminum foil crimped to the



Table 6. - Sales of various types of milk products, by size of container, seven milk distributors, Memphis, Tennessee, 1948

Product	Size of Container			
	Quarts number	One-third Quarts number	One-half Pints number	Bulk gallons
Whole-milk products:				
Grade A milk	10,017,900	2,484,900	648,700	103,200
Homogenized Vitamin D milk	2,336,000	2,998,200	408,000	13,000
High test milk	1,203,600	49,400	600	---
Bulgarian buttermilk	156,000	854,600	28,800	900
Total	13,713,500	6,387,100	1,086,100	117,100
Low-fat milk products:				
Buttermilk (plain)	2,958,300	700	---	32,200
Chocolate milk	353,600	2,665,600	327,100	100
Skim milk	11,500	---	---	9,200
Total	3,323,400	2,666,300	327,100	41,500
Cream:				
Light cream (table or X)	229,500	297,600	11,800	9,900
Heavy cream (whipping or XX)	23,300	128,000	21,000	10,100
Bulk for manufacture into ice cream	---	---	---	94,700
Total	252,800	425,600	32,800	114,700
Other products <sup>1/</sup>	56,300	---	23,300	11,200
Total	17,346,000	9,479,000	1,469,300	284,500

<sup>1/</sup> Consists principally of eggnog, 10 percent cream, and 12 percent cream.

pouring lip and extending approximately one-half inch down around the top of the bottle. As the Memphis dealers used universal bottles, the caps bore the only identification appearing on the containers.

The cost of caps averaged 0.27 cents per quart -- the same as bottle cost. The cost of caps varied much less than bottle costs, the extremes being 0.18 and 0.31 cents per quart.

Expenses for cans and cases averaged 0.07 cents per quart, ranging from 0.01 to 0.16 cents.

Costs of containers for some dealers tended to be low because of a larger proportion of sales in bulk. Sales in gallon lots or larger accounted for as much as 22 percent of the sales of one dealer in terms of quarts milk equivalent. The other extreme was 2 percent.

A total of 28,295,000 units, counting each bottle as a unit, made up the sales of 22,028,000 quarts of milk equivalent, or 1.28 containers per quart of milk equivalent. The retail dealers used the fewest containers per quart of milk equivalent, approximately 1.2 per quart, whereas dealers with wholesale businesses used up to 1.7 containers per quart. Container costs per quart failed to show a close rela-



tion to the number of containers used per quart, but were influenced mainly by the rate of bottle losses. The cost of cans differed considerably as to the type of can used. Expenses for cans and cases were variable because such items have a fairly long life and they were not bought at regular intervals. An accrual basis of accounting might have been preferable for the expense for cans and cases, but was not practicable because satisfactory inventory data were lacking.

### Supplies

The cost of supplies ranked fourth highest of all items of total expense. For each dollar of sales, dealers spent from 1.6 to 2.7 cents on supplies. In terms of quarts of milk equivalent, supply costs ranged from 0.30 to 0.49 cent, averaging 0.42 cent. The variation in costs of supplies per quart of milk between dealers was less than in any other item of cost.

More items were classified under supplies than in any other group of expenses. Some supplies (such as sugar, chocolate, and vitamin D concentrate) actually became a part of the finished products. On the other hand, a considerable proportion of the purchased supplies consisted of cleaning materials, uniforms worn in the plants, and miscellaneous items.

### Equipment

The repairs plus depreciation on plant equipment, during the year under study, were about 0.78 cent to 4.33 cents for each dollar of sales, averaging 2.12 cents. Equipment was usually depreciated over a period of 6 to 10 years, depending upon its usage. Depreciation charges and repairs each averaged about \$6,100 per plant. Expressed in terms of cost per quart, the totals of these expenses ranged from 0.15 to 0.87 cent per quart of milk equivalent. The range of expenses for equipment repairs was 0.05 to 0.64 cent per quart. Depreciation ranged from 0.10 to 0.54 cents.

### Power, Fuel, and Refrigeration

Total expenses for utility items including coal and refrigeration, averaged 0.18 cent per quart, ranging from 0.13 cent to 0.37 cents. The leading item was fuel expense, followed by electricity, refrigeration, and water. Processed dairy products handled ranged from 220 to 480 pounds per kilowatt hour of electricity used, at the five plants for which data on the use of electricity were available (table 5). The quantity of electricity used by these plants increased from January through August, then declined until about December. There was a tendency for larger plants to handle more pounds of product per kilowatt hour than did small plants. The cost per kilowatt hour of electricity ranged from 1.4 cents for small milk distributors to approximately 1.3 cents for large distributors.

No significant difference was noted in the cost of fuel as between coal and gas. For each 100 pounds of product handled, the cost of coal ranged from 2 to 8 cents. On the same basis, costs of dealers using gas varied from 3 to 5 cents per 100 pounds of product.

The costs of refrigeration include actual purchases of ammonia and ice. Repairs, depreciation, and other costs of refrigeration equipment, were included in the corresponding items of equipment expense. The expense for power used in operating refrigeration equipment was not separated from other uses of power. Some dealers owned ice machines and made their own ice, though they often found it necessary to buy some additional ice during the summer. Costs of refrigeration ranged from less than 0.01 of a cent to about 0.07 of a cent per quart equivalent, averaging 0.05 cent.



Table 5. - Quantity of milk equivalent handled per kilowatt hour of electricity used, five milk distributors, Memphis, Tennessee, 1948

Plant number	Product handled per kilowatt hour of electricity used
	Pounds
1	270
2	220
3	250
4	270
5	480
Average	380

### Buildings

Building expense included repairs, maintenance, depreciation, rent, and taxes. The average cost of building repairs and maintenance amounted to more than the yearly depreciation taken on buildings. Possibly this relationship was abnormal, for many repairs had been deferred during the war and shortly thereafter, because of the scarcity of materials and the high costs. Depreciation charges were based on investments made over a period of years. During most earlier years, the building costs were lower than in 1948. Repair costs, obviously, were charged at the rates actually in effect in 1948. Building repairs approximated \$1,400 per plant compared with slightly under \$1,300 taken in depreciation. The charges for repairs exclude expenditures for remodeling, modernization, or substantial alterations. Real estate taxes averaged \$250 per plant. One plant was in a rented building; the rental charge was taken as the measure of building costs and was prorated between depreciation and taxes according to the average ratio between these items at the other plants. Altogether, the total of these four expenditures ranged from 0.05 cents to .32 cents per quart of milk processed.

Building costs were relatively uniform per square foot of floor space, ranging from 41 to 80 cents annually. Four dealers were in the range of 41 to 50 cents. Therefore, the range in building expense per quart, which was sixfold, resulted largely from variations in the quantity of product handled per square foot of floor space. In quarts of milk equivalent sold daily, this ranged from 0.6 to 2.1, averaging 1.56.

### Taxes, Licenses, and Insurance

Among the more important taxes paid by the Memphis milk distributors were property taxes other than on real estate, State franchise taxes, and certain pay-roll expenses such as social security and workmen's compensation. The Tennessee and Arkansas sales taxes, which amounted to approximately 2 percent of each dollar of retail sales, were excluded from both receipts and expenses. In addition to the taxes and licenses shown here, there were real estate taxes which were classified as part of building expenses, and truck licenses which were classified as part of truck expense.



The cost of property and liability insurance was about as large as the amount paid as taxes.

Total expense for taxes, licenses, and insurance approximated 0.15 cent per quart of milk equivalent or 0.8 cent per dollar of sales. The range between dealers was relatively narrow, from 0.09 to 0.23 cents per dollar of sales.

### Truck and Automobile

Trucks were being operated on 87 delivery routes by the seven distributors at the close of the year. During the year some dealers increased their number of routes, some decreased their number of routes, depending upon changes in number of customers. The delivery routes at the end of the year were divided into 38 retail, 34 wholesale, and 15 mixed routes.

Practically all dealers maintained extra trucks which could be used in an emergency to replace those on regular routes. Automobiles were kept for use by company officers and by salesmen in visiting customers or prospective customers.

The cost of gas and oil for trucks averaged approximately \$1.29 per route per day. The cost on the average routes of individual dealers ranged as high as \$2.88 per route. Fuel costs were higher per route where wholesale business predominated, but they varied less per quart equivalent sold.

It was a real problem for dealers to maintain their trucks in good mechanical condition, because a large percentage of the vehicles were 7 to 10 years old. Ordinarily, these old trucks would have been replaced, but it had been difficult to obtain new trucks in the years immediately preceding this study. Repair costs averaged \$1.25 per route per day, and some dealers spent as much as \$4.03 per route per day on the maintenance of their trucks.

The annual truck depreciation per truck route amounted to \$230 or 63 cents per day in 1948. For many of the trucks depreciation charges before 1948 had completely offset the original cost, so the average charge in 1948 was probably only half to three-fourths as large as it would be when trucks were being replaced more frequently. During recent years, dealers have had to pay from \$1,800 to \$2,000 for new trucks and \$500 to \$600 for having new bodies fitted onto trucks. Normally, these would be operated for about 6 years and would then be replaced, resulting in a depreciation charge of nearly \$350 per year. As it was usually necessary to have more than one truck per route, a normal charge for truck depreciation at present prices might be higher than the present charge by more than \$100 per year, or 0.04 cent per quart. Part of this increase would be offset by lower expense for repairs.

The fourth largest expense in the operation of trucks was made up of repairs and purchase of tires and tubes. This total cost averaged \$136 per route.

Yearly payments of automobile and truck insurance averaged \$80 per route. State and city licenses cost \$35 per route. The license charge was higher than the license fee for a single truck of average size because (1) trucks were sometimes operating in more than one State, requiring two or more license plates; (2) some trucks and automobiles were traded during the year and new license plates were bought for the new vehicle; and (3) it was necessary to keep more trucks than there were routes.

Truck costs per day were influenced by the number of miles traveled daily. The average route mileage for the seven dealers was 42 miles per route. The range between dealers was 25 to 99 miles, being influenced by the plant location of the



dealer and the degree of concentration of customers. Truck costs per mile ranged from 4.8 to 11.2 cents, averaging 9.2 cents. The quantity of milk delivered per mile of travel ranged from 8.9 to 25.3 quarts, and averaged 17.2 quarts per mile.

Total operating and maintenance cost for trucks ranged from 2.5 to 4.7 cents per dollar of sales, averaging 3.0 cents. Per quart of milk equivalent, these expenses varied from 0.5 to 1.2 cent, averaging 0.56 cent.

#### Advertising

Advertising was conducted through the Memphis Dairy Council, local newspapers and radio stations, and the Memphis telephone directory. The Council stressed information on the nutritional value and the importance of using dairy products in the daily diet. More than 50 percent of dealers' advertising money went to this organization. This averaged an expenditure of \$2,200 for each distributor.

Newspaper and radio advertising was conducted by the individual distributors each giving emphasis to his particular brand of products. Most of this publicity appeared in the Memphis newspapers either as classified advertisements or as cartoons. One distributor sponsored a radio program during the year. Total newspaper and radio advertising cost an average of \$1,600 per distributor.

All distributors carried advertisements in the classified section of the Memphis telephone directory. The cost of these varied from approximately \$10 to \$50 per month, depending upon the size. They averaged about \$20 per month for each distributor.

Total advertising cost was 0.7 cent for each 1 dollar of sales.

#### Telephone, Telegraph, and Office Expenses

Telephone and telegraph expense averaged about \$425 for each distributor, or 0.1 cent per dollar of sales.

Office expenses, consisting of purchases of stamps, stationery, pencils, and other general office supplies, plus rentals and service costs on office equipment, averaged \$1,100 each, for these seven distributors, 0.2 cent per dollar of sales.

#### Miscellaneous Expenses

Miscellaneous expenses included costs of professional services, dues and subscriptions, donations, bad debts, interest on borrowed money, and miscellaneous expenses not classified elsewhere. They totaled \$7,600 per dealer.

Professional services included fees for auditors, allowances for travel by officers and directors outside the Memphis area, and special engineering services used in planning and reorganizing plant lay-out. These expenditures averaged about \$800 for each distributor.

Dues and subscriptions averaged \$600 per dealer. Dues were paid primarily to dairy trade organizations and local business groups. Subscriptions included trade journals and local periodicals.

Donations averaged approximately \$300 for each distributor. Contributions were made to the American Red Cross, Community Chest, and other community projects.



Losses from bad debts averaged \$600 for each distributor in the year studied. Interest payments averaged \$700.

Additional miscellaneous expense included all items the purpose of which could not be readily identified from plant records, and some cash outlays for miscellaneous services. These expenditures averaged \$4,600 for each dealer or 0.24 cent per quart.

### Operating Expenses by Departmental Groupings

The customary division of operating expenses into functional or departmental groupings consisting of receiving and processing, selling and delivering, and administrative and general expense is shown in table 7.

The cost of receiving and processing milk made up approximately one-half of all operating expenses (fig. 2). Labor employed in receiving and processing milk formed about 40 percent of total expenses for this function, or \$36,000 per plant. Other expense items, each of which amounted to more than \$12,000 per distributor, were containers, supplies, and equipment.

Table 7. - Average operating expenses per dealer, by functions, seven milk distributors, Memphis, Tennessee, 1948

Item	Receiving and processing	Selling and delivery	Administrative and general
Labor	\$35,700	\$43,700	\$22,000
Containers	19,100	---	---
Supplies	13,400	---	---
Equipment	12,300	---	---
Power, etc.	5,800	---	---
Buildings	2,900	---	---
Taxes	2,000	100	2,500
Truck and auto	---	17,500	---
Advertising	---	4,000	---
Office expense	---	---	1,100
Telephone and telegraph	---	---	400
Miscellaneous	2,200	3,900	1,500
Total	\$93,400	\$69,200	\$27,500



In selling and delivering milk the two largest expenditures were wages of route men and up-keep on trucks. These were 63 percent and 25 percent, respectively, of the total expense. Advertising and miscellaneous expenses each accounted for approximately one-half of all other costs of selling and delivering.

Eighty percent of general and administration expense consisted of salaries and wages for officers and office employees. More than one-half of the remaining expenditures was for taxes.

### Profits

Net earnings before taxes of the seven Memphis milk distributors averaged 0.7 cent per dollar of sales, 6 cents per hundredweight of milk equivalent, or 0.13 cent per quart. The rates of return on investment averaged 2.5 percent on total assets and 5.3 percent on net worth, or owners' investment. Four of the seven dealers experienced net losses on the year's operations, while three had profits. The range in rates of return on total assets was considerable; from a loss of 16 percent to a profit of 23 percent. Profits per quart ranged from a loss of 1.4 cents to a profit of 1.1 cents.

The Federal Trade Commission, by comparison found that 82 milk and milk products distributors had an average return in 1940 of 5.4 percent on stockholders' investment.<sup>8/</sup> The average profits of six milk companies in the New York-New Jersey metropolitan area were 3.4 percent of owners' investment for the 7-year period 1941-1947.<sup>9/</sup> Yearly average rates for the New York-New Jersey group ranged from a loss of 2.6 percent in 1942 to profits of 7.6 percent in 1946. In these respects, profits of these seven Memphis milk distributors appear to be about the same as those of milk distributors in other markets.

It was found in Memphis, as it has been found in cost studies elsewhere, that profits are not an important potential source of higher prices of milk to farmers or of lower prices of milk to consumers.<sup>10/</sup> That losses were experienced by four out of seven dealers suggests a precarious balance of costs and returns for the market as a whole. However, the dealers who made profits in 1948 may be able to do so consistently, or to maintain their relative rank during years when losses are more general. Dealers who had losses in 1948 face the necessity of making sharp adjustment in their costs if they are to continue in operation. Resources out of which such dealers may be able to continue for some years include their annual depreciation charges, and the fact that the proprietors may have other sources of income out of which to pay living expenses, rather than drawing on officers' salary allowances (p. 11).

The present study found that 7 milk distributors in Memphis had an average profit of 5.3 percent on the owners' investment, but the Federal Trade Commission found that average profits of 3 milk distributors in Memphis in 1940 averaged 22.5 percent. The distributors' margin on milk delivered to homes in Memphis was 5.3 cents per quart in 1940 but in 1948 it was only 6.0 cents. Since the national average

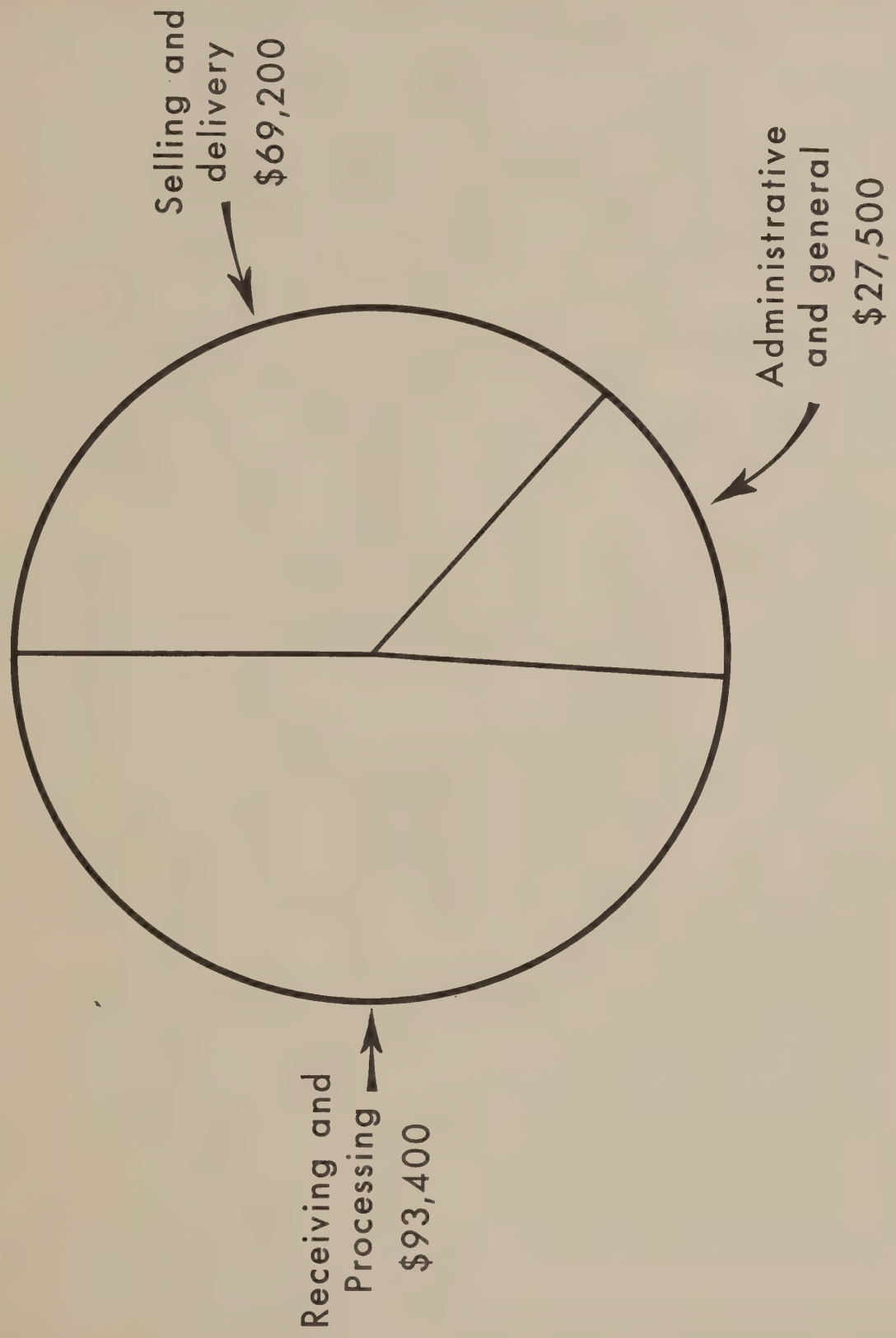
<sup>8/</sup> United States Federal Trade Commission. Report of the Federal Trade Commission Distribution Methods and Costs, Part VI, Milk Distribution, Prices, Spreads and Profits, 58 pp. Washington, D. C., 1945

<sup>9/</sup> Spencer, Leland. An Economic Study of the Operations of Six Leading Milk Companies in the New York-New Jersey Metropolitan Area. 1941-48. (Processed.) N. Y. Cornell Agr. Expt. Sta. A.E. 686, 47 pp. 1949.

<sup>10/</sup> See footnotes 8 and 9, p. 20; 13, p. 21; and footnotes 3, 5 and 7 to table 16, p. 28.



# AVERAGE OPERATING EXPENSES PER DEALER, SEVEN MILK DISTRIBUTORS, MEMPHIS, TENNESSEE, 1948









margin on fluid milk is estimated at 7.3 cents in 1940 and 9.4 cents in 1948, profits of milk distributors in Memphis may have been much smaller in 1948 than in 1940. The Federal Trade Commission studied only three distributors, whose average profit may not have been representative of all distributors in the market. Likewise, the average profit of the seven distributors included in the present study may not be representative of average profits of the two distributors not included in this study.

### CAPITAL AND INVESTMENT

The average investment of the seven distributors in facilities, inventories and credit was \$160,000 per plant, \$49.00 per thousand quarts of milk equivalent.<sup>11/</sup> This was divided about equally between current assets, such as accounts receivable and inventories, and fixed assets consisting of equipment, buildings and land (table 8).

Plant equipment accounted for about 60 percent of the investments in fixed assets. Buildings and trucks also were major items, while land and furniture and fixtures were each only 2 to 3 percent of total fixed assets. The total investment in fixed assets ranged from \$20 to \$43 per thousand quarts of milk equivalent. Dealers having a low investment were likely also to have low expenses per quart for buildings, equipment, and trucks.

On the other side of the balance sheet, liabilities and net worth also were about equally divided. The balance sheets showed a current ratio of 1.2 to 1. Current ratios of milk-distributing firms are characteristically low, owing to the relative stability of sales volume. Other studies have found ratios of groups of firms ranging from less than 1 to 1 <sup>12/</sup> on up to 1.8 to 1. <sup>13/</sup>

### COMPARISON OF WHOLESALE AND RETAIL BUSINESSES

Three distributors sold a large proportion of their products wholesale, whereas four dealers had a large percentage of retail business. Some of the contrasting characteristics of these two groups are shown in table 9. Each of the three wholesale dealers sold less than 10 percent of their products at retail, while each of the "retail" dealers sold between 40 percent and 65 percent at retail.

The values of the sales of the wholesale and retail groups per quart of milk equivalent reflected offsetting tendencies. While the prices of quarts and 1/3 quarts were lower at wholesale than at retail, the price of three 1/3 quarts at wholesale was usually about the same as 1 quart at retail. Most of the 1/3 quarts of milk were sold to wholesale customers, whereas quarts were sold mainly at retail. Also, wholesale business ran heavily to cream, buttermilk, and chocolate milk. The sale price for a given quantity of milk converted into these products

<sup>11/</sup> Only three distributors had complete balance sheets showing all assets and liabilities. Data on fixed assets, total liabilities, and net worth were complete for five distributors. Varying procedures were used to estimate the missing data, utilizing in part average ratios calculated from the three complete balance sheets. The total assets shown in the three complete balance sheets amounted to about 72 percent of the estimated total assets of the seven distributors.

<sup>12/</sup> United States Agricultural Adjustment Administration. A Survey of Milk Marketing in Milwaukee. U. S. Agr. Mktg. Admin. Mktg. Info. Ser. DM-1. May, 1937.

<sup>13/</sup> Spencer, Leland. Costs of Distributing Milk in New Jersey. New Jersey Department of Agriculture. May, 1943.



Table 8. - Assets, liabilities and net worth, seven milk distributors,  
Memphis, Tennessee, December 31, 1948

Item	Average per distributor
Current assets	
Cash	\$14,500
Accounts and notes receivable	42,500
Inventories	25,900
Other	4,700
Total current assets	\$87,600
Fixed assets	
Land	\$2,100
Buildings	13,600
Plant equipment	47,200
Trucks and autos	9,600
Furniture and fixtures	1,700
Total fixed assets	\$74,200
Other assets	1,600
Total assets	\$163,400
Liabilities	
Current	\$74,200
Other	11,200
Total liabilities	\$85,400
Net worth	78,000
Total liabilities and net worth	\$163,400

was higher than for the same quantity sold as plain bottled milk (page 11). Thus, the net result of differences in sizes of containers and kinds of products was that the value of sales per quart of milk equivalent was about the same for wholesale as for retail distributors. On the other hand, costs of processing milk in smaller containers and into a variety of products tends to be higher than for merely pasteurizing milk and bottling it into quarts. This explains the small difference in cost of plant labor between the groups.

The most striking difference in expenses between wholesale and retail dealers was in the labor costs for selling and delivering milk (table 9). Labor costs in the delivery of milk by retail dealers per quart of milk equivalent were approximately 1.0 cent higher than were the delivery costs for wholesale dealers. Plant and administrative labor costs also were lower for the wholesale than for the retail group. The only other items in which the wholesale group showed lower costs were buildings and supplies.

Total expenses were approximately 0.4 cent per quart of milk equivalent lower for the group of wholesale distributors than for the retail distributors. The average size of the businesses in the wholesale group was less than half that among the retail distributors. Moreover, expenses were likely to be higher among the smaller



Table 9. - Comparison of expenses of four retail milk distributors and three wholesale milk distributors, Memphis, Tennessee, 1948

Item	Wholesale	Retail
	Cents per quart	Cents per quart
Labor:		
Administrative and plant	1.73	1.86
Selling and delivery	.59	1.63
Total	2.32	3.49
Power, etc.	.26	.16
Buildings	.09	.10
Equipment	.50	.36
Taxes	.16	.14
Supplies	.42	.43
Truck and automobile	.57	.55
Containers	.70	.58
Telephone and telegraph	.02	.01
Office expense	.04	.03
Advertising	.15	.12
Other expense	.52	.16
Total expense	5.75	6.13

distributors in each group. Taking account of these two facts, the average difference of 0.4 cent probably understates the difference which might be expected between representative wholesale and retail distributors of equal size.

This comparison of wholesale and retail businesses does not show how much more it costs milk distributors to process and deliver a quart of milk to a consumer's home than to retail store for the further reasons that the "retail" distributors did about half of their business at wholesale, and that the sizes of containers and types of products were different between the two classes of trade.

#### COMPARISON OF EXPENSES OF LARGE AND SMALL DEALERS

The cost of processing and delivering a quart of milk equivalent was 20 percent, or about 1.4 cents per quart, less for the three largest distributors than for the four smallest distributors (table 10). Containers, supplies, and advertising were the only expense items which were larger for the distributors with the greatest volume of business. The greatest savings made by large distributors was in



Table 10. - Comparison of expenses of three large milk distributors and four small distributors, Memphis, Tennessee, 1948

Item	Large Distributors	Small Distributors
	(cents per qt.)	(cents per qt.)
Labor		
Administrative and plant	1.72	2.25
Selling and delivery	1.38	1.42
Total	3.10	3.67
Power, etc.	.17	.26
Buildings	.06	.21
Equipment	.32	.66
Taxes	.14	.17
Supplies	.43	.41
Trucks and automobile	.49	.81
Containers	.64	.50
Telephone and telegraph	.01	.02
Office expense	.03	.05
Advertising	.13	.11
Other expenses	.24	.27
Total expenses	5.76	7.14

administrative and plant labor and in expenses for equipment and for operating and maintaining trucks. The total expense per dollar of sales was 4.5 cents less for large distributors than for small distributors. Average daily sales of the large distributors amounted to 5,820 quarts, about five times the 1,140 quarts sold daily per small distributor.

The advantage of large size was shown definitely in the output of product per worker. The larger plants averaged 260 quarts of milk equivalent per worker, while the smaller plants handled 200 quarts per worker. The greater efficiency in the larger plants showed up most clearly in output per plant worker, and was less noticeable in output of office and delivery workers. In the large concerns, output per plant worker was about 70 percent greater than in smaller plants. Output per delivery worker was only about 10 percent greater in the large plants. The small difference in productivity of delivery workers is partly accounted for by the larger proportion of wholesale business done by the small plants as a group.



## COSTS OF OBTAINING SUPPLEMENTAL MILK

During certain months of 1948, local milk supplies were less than the requirements, and it was necessary to procure supplemental supplies from outside the milkshed.

The cost of imported milk was higher than the price of milk from the local Memphis milkshed. This difference in costs was borne by the milk bargaining association of the local producers. The dealers paid the same price for milk for bottled uses, whatever its origin. Any comparison of dealers' costs and margins between Memphis and other markets, therefore, should take account of the costs of importing milk.<sup>14/</sup>

### Prices Paid and Handling Charges

The weighted average price f.o.b. Wisconsin plant for whole milk shipped to Memphis in 1948 was \$5.121 per hundredweight for milk containing 3.56 percent butterfat. The basic quotation from which prices were calculated at some sources was the minimum price for Class I milk under the Federal order for the Chicago market. This price was adjusted by differentials for butterfat and location, and a plant charge was added. At one source, from which a considerable supply was obtained, the price f.o.b. point of origin was fixed by negotiation rather than by formula; it fluctuated somewhat less than the Chicago price.

Skim milk was imported in considerable quantities during November and December 1948, at a price of \$1.25 per hundredweight f.o.b. Wisconsin plant. The margin taken by the country plant on skim milk would have been \$0.511 per hundredweight if this skim milk had been obtained from milk priced in Class III under the Chicago order, or a negative margin or loss of \$0.211, if it had come from Class I milk.

### Transportation Costs

The weighted average cost of transporting the milk imported from Wisconsin to Memphis in 1948 was \$1.424 per hundredweight, including the Federal transportation tax of 3 percent (table 11). Tank trucks were used exclusively for this service.

An additional transportation charge was incurred for the movement of the milk which was transferred from the tank trucks to cans, at Memphis, and they distributed to smaller dealers. This cost amounted to \$0.252 per hundredweight of the milk that was handled this way, or \$0.042 per hundredweight of total imports.

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<sup>14/</sup> The milk producers association undertakes to provide all the milk required by the dealers with whom it has contracts. It has a producer-pricing plan aimed toward encouraging even seasonal patterns of production among producers, as a measure for fulfilling this undertaking. One feature of this plan is that the added costs of supplemental milk are charged to those producers whose fluctuating milk production made supplemental supplies necessary. A description of this plan is given in Analysis of the Base-Quota Plan in the Memphis Milkshed, by Hans G. Hirsch and Irwin R. Hedges. U. S. Farm Credit Admin. Misc. Rpt. 131, March, 1949.



Table 11. - Costs of procuring supplemental milk for the Memphis market, 1948

Item	Total	Per cwt. of milk imported	Per cwt. of total milk sold by distributors <sup>1/</sup>
<b>Costs</b>			
Transportation			
Wisconsin to Memphis	\$53,331.47	\$1.423	\$ .043
Between plants in Memphis	1,574.35	.042	.001
Handling charge	1,253.87	.033	.001
Administrative salaries	2,440.82	.065	.002
Miscellaneous	846.71	.023	.001
Total transportation and handling	\$59,447.22	\$1.586	\$ .048
Milk loss	1,802.56	.048	.001
Butterfat loss	1,050.77	.028	.001
Total	\$62,300.55	\$1.662	\$ .050
<b>Credits</b>			
Difference between Memphis Class I price and price paid f.o.b. Wisconsin plant	\$28,330.98	\$ .756	\$ .023
Balance, costs absorbed by Memphis producers	\$33,969.57 <sup>2/</sup>	\$ .906	\$ .027

<sup>1/</sup> On the basis of the estimate that distributors in the study sold 40 percent of the milk handled in the market (page 3).

<sup>2/</sup> Items which were considered to be costs for the purpose of this report did not include all the Association's charges against producers' underquota milk, shown in F.C.A. Misc. Rpt. 131.

#### Other Costs of Importing Milk

The charge for transferring milk from tank trucks to cans, and storing the milk in cans until it was distributed to other dealers, was \$0.20 per hundredweight. Averaged over the total volume of imports, it amounted to \$0.033 per hundredweight.

The next largest item of cost, after transportation and handling charges, was the charge for activities of Association personnel in arranging for imports, supervising the operation, and keeping the necessary records. The allocation of salaries to cover these items, as made by the Association, resulted in an average charge of \$0.065 per hundredweight.

Telephone, telegraph, and printing charges totaled \$0.010, and the cost of hotel accommodations provided for truck drivers -- whenever their schedule required them to stay overnight in Memphis -- was \$0.012.



A significant item of cost in handling this imported milk was the physical loss or waste of product.<sup>15/</sup>

The total quantity of milk shipped or billed to the Association from supplemental sources, in 1948, based on invoices or statements rendered by the shippers, was 3,748,694 pounds.<sup>16/</sup> but complete data were available only for 137 shipments which carried 3,429,211 pounds, including 2,979,611 pounds of whole milk and 449,600 pounds of skim milk.<sup>17/</sup> The total quantity disposed of by the Association out of the latter shipments was 3,388,024 pounds. There was a loss of 41,187 pounds of whole and skim milk, or 1.2 percent of the total. The values of milk and skim milk lost resulted in a charge of \$0.048 per hundredweight for loss of milk.

The shrinkage of butterfat between buyer and seller for the Memphis supplemental milk supply in 1948 amounted to 2,535 pounds, or 2.4 percent of the total. Nearly half of the loss of butterfat resulted from loss of milk and the remainder from differences between percentages of butterfat. The weighted average percentage of butterfat in whole milk purchased by the Association was 3.562 percent, and in whole milk sold was 3.519. The cost of the additional loss of butterfat resulting from differences between percentages of butterfat was \$.028 per hundredweight of all milk.

Table 11 gives a summary of these costs, including an estimate of the additional expense which dealers would have incurred if they had paid all the costs of importing milk. For each hundredweight of milk imported, the price to distributors averaged \$0.906 less than the price in Wisconsin plus transportation and other procurement costs. On the basis of estimated sales of 120,000,000 pounds of milk equivalent, in 1948, the full cost of imported milk would have added about \$0.027 to dealers' expenses per hundredweight of milk, or about 0.058 cents per quart. This amount is equal to nearly half of the net profit of the seven milk distributors for the year.

#### COMPARISON WITH OTHER MARKETS

The price spread taken by milk distributors in Memphis was one of the lowest in the United States, yet this study shows that it was enough to cover the average costs of these distributors. Some of the reasons for this achievement are evident when comparisons are made between certain measures of performance in Memphis and like data from other cost studies (table 16).

Outstanding efficiency is shown for Memphis distributors in the use of capital (investment in fixed assets for 100 quarts of milk equivalent daily) and the quantity of milk delivered per route.

<sup>15/</sup> The losses described here are those that occurred before the milk reached the Memphis dealers' plant. Unit-cost figures in this section are based on quantities of milk shown on invoices of the sellers from whom the producers' association bought it; rather than on the quantities actually delivered to the dealers.

<sup>16/</sup> This total is larger than that shown in F.C.A. Misc. Rpt. 131, the difference being accounted for by shrinkage, and by quantities shown in the records of the Association but not in its published reports.

<sup>17/</sup> The shipments not included in the shrinkage study were shipments of skim milk during December for which the supplier accepted the Association's weights. There probably was shrinkage on this skim milk, but the available records did not permit its measurement, and the cost was absorbed by the supplier.



Table 16. - Comparison of certain measures of performance between the average of seven milk distributors, Memphis, Tennessee, 1948, and selected other markets.

Item	Memphis: 1948	Montana: 1947 <sup>1/2</sup>	Maine <sup>3/2</sup> : 1947-48	New Jersey: 1942 <sup>4</sup>	Maine <sup>5/2</sup> : 1935-36	Milwaukee: 1934 <sup>6</sup>	West Virginia: 1933 <sup>7</sup>
Investment in fixed assets per 100 quarts daily	\$859	\$2,800	\$1,880	---	\$1,280	\$1,675	\$1,780
Quarts per hour per worker							
Plant Delivery	70	58	54	---	59	67	---
Quarts daily per employee	245	---	---	---	181	---	168
Quarts daily per route							
Retail	367	---	---	275	---	274	---
Wholesale	1,170	---	---	793	---	612	---
All routes	696	---	448	---	378	309	297
Miles per 100 quarts	5.8	4.4	1.9	9.4	8.1	5.4	---
Total quarts milk handled daily	6,000	1,150	7,000	---	5,530	18,800	2,100
Percent sold wholesale	62	41	48	---	48	27	70

1/ Korzan, Gerald E. Costs of Distributing Milk in Montana Markets. Mont. Agr. Expt. Sta. Bul. 462, July 1949.

2/ Most of the data on quantities of milk equivalent were reported on a different basis in the original report. For this table, the data have been adjusted to be comparable with the Memphis quantities, which were total quarts of product regardless of type of product, size of container or channel of sale.

3/ Perry, Alvah L. Costs of Distributing Milk in Maine Markets. Me. Agr. Expt. Sta. Bul. 451, July 1947. Data are those reported for 11 large dealers.

4/ See Footnote 13, p. 21. Data are those reported for large dealers in Northern New Jersey.

5/ Dow, George F. An Economic Study of Milk Distribution in Maine Markets. Me. Agr. Expt. Sta. Bul. 395, March 1939. Data are those reported for 4 large dealers.

6/ See Footnote 12, p. 21.

7/ Stelzer, R. O., and Thurston, L. M. Milk-Distribution Costs in West Virginia. I, A Study of Costs Incurred in 22 Plants during 1933. W. Va. Agr. Expt. Sta. Bul. 266, April 1935.



The Memphis investment per 100 quarts daily was shown to be lower than that shown by any of five other investigations extending over the last 15 years, which indicates that operations were near capacity, or that assets were valued relatively low.

A rough measure of the relation of volume to capacity was given by the measurement of floor space. Using average figures, the Memphis distributors handled 1 quart of milk daily for each 0.64 square foot of floor space. The Milwaukee study (see footnote 12, p. 21) found 1 quart of milk received daily per 0.70 square foot of floor space.

Labor performance was substantially higher for the Memphis distributors than for distributors in other markets, according to each of the available measures.

Truck mileage per 100 quarts was apparently the only factor in which dealers in some other markets were more effective than those in Memphis. Out of five other markets, two had lower mileages per 100 quarts sold, two had higher, and one had about the same.

The condition which seems to have contributed most to the comparative efficiency of the milk distributors in Memphis has been a substantial increase in volume of sales shared by a decreasing number of distributors. It has been mentioned that the population of the Memphis metropolitan district increased about 45 percent from 1930 to 1948, and that producer-distributors, who were numerous and important in 1930, had disappeared completely by 1948. Some of the remaining distributors further increased their volume of business by delivering milk to outlying towns. There are no data on per capita consumption of milk in Memphis, but it is believed to be higher now than before the war, as in most other cities.

These trends in total volume of milk sales in Memphis have favored low distribution costs. But other cities may be able to show similar trends in milk sales without similar trends in costs and margins. In such cases differences in price policies of milk distributors may be a further explanation of the situation in Memphis. The initial effect of rising volume of milk sales in Memphis might have been dissipated if prices and distributors' margins had not been narrowed in line with the reduction in costs. If the more efficient firms had taken larger profits at an earlier stage, more distributors might have continued to operate, all at a lower percentage of capacity and at higher costs. The price policies of the more efficient firms in the market, therefore, appear to be a factor in the present situation.

#### SUMMARY

Costs of milk distribution incurred by the seven Memphis milk distributors covered in this study averaged 6.04 cents per quart in 1948, or \$2.83 per hundred pounds of milk equivalent handled in that year.

Among these dealers the expenses of processing and delivering milk per quart of milk equivalent were as low as 5.3 cents and as high as 8.2 cents. The differences in costs reflected differences in efficiency of operation, and in the nature of services performed.

Salaries and wages made up more than half of the cost of distribution. Other expenses fell into ten classes, no one of which accounted for more than 10 percent of the total cost. Labor efficiency, therefore, was the most important of the several factors that affected the costs of distributing this milk.



These seven Memphis milk distributors sold 245 quarts of milk equivalent daily, per employee, as ascertained from total sales and total number of employees. On retail routes, 367 quarts of milk equivalent were sold daily per route. Sales on wholesale routes averaged 1,170 quarts daily; however, sales volume on wholesale routes was extremely variable between distributors. Sales at wholesale accounted for 62 percent of the gross income, and sales at retail for 38 percent.

Both size of business and channel of sale affected the costs of distribution. Three dealers, averaging about 5,600 quarts of milk daily, had costs that were 1.4 cent per quart lower than dealers had who averaged about 1,100 quarts daily. Distributors who were selling more than 90 percent of their milk at wholesale had 0.4 cent per quart lower costs, compared with distributors selling 40 to 65 percent of their milk at retail. Both of these comparisons were complicated by the tendency for the group of small distributors to have more wholesale business, and, conversely, for distributors in the wholesale group to be smaller in volume of business.

The ability of these Memphis dealers to cover their average costs by one of the lowest margins reported in the United States was largely a result of relatively efficient use of capital and labor. Steady and substantial growth in volume handled by these distributors evidently contributed to this degree of efficiency. This increase sprang from the decline in numbers of producer-distributors, from the growth in population in the metropolitan area, and from the trend toward broadening the market area by delivering in outlying towns. It appears, also, that the more efficient firms in the market have favored narrow margins as a policy which would protect and reinforce the economies of increasing volume.















